cHEMYSTERy

A HALF-YEARLY MAGAZINE ON CHEMISTRY

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DEPARTMENT OF CHEMISTRY

BARASAT GOVERNMENT COLLEGE

Why study chemistry?

A degree in chemistry opens the door to a wide range of career options – far more than you may have realised. Chemists are not just confined to the lab!

Chemists play a vital role in developing many of the everyday products we take for granted and help to sustain and improve our quality of life.

Lots of trained chemists end up in non-traditional chemistry careers because of all the transferable skills they gain from studying chemistry.

As a chemist you can...

... fight disease

Discover new medicines to prevent, treat and cure illness and find better ways of diagnosing disease.

... feed the world

Develop new ways of controlling plant and animal pests, or invent novel foods and flavours.

... inspire the next generation

Share your chemistry knowledge as a teacher and help others to pursue an interest in chemistry.

... protect our environment

Test the safety of products such as medicines and cosmetics and find greener ways of making them.

... solve crime

Use forensic techniques to analyse and investigate trace evidence from the scene of a crime.

... invent new products

Create new materials for the 21st century, which can be used in anything from solar panels to waterproof jackets.

CONTENTS

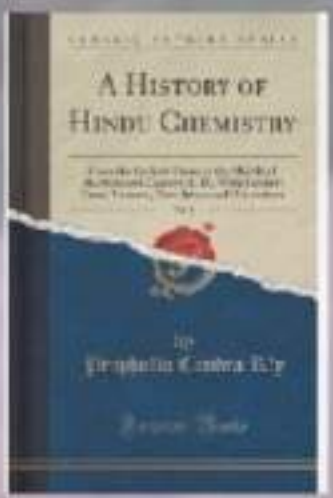
ACHARYA PRAFULLA CHANDRA RAY
(father of Indian Chemistry)

Sir Prafulla Chandra Ray (ACHARYA)CIE, FNI, FRASB, FIAS, FCS (2 August 1861 – 16 June 1944)was an eminent Bengali chemist, educationist, historian, industrialist and philanthropist. He established the first modern Indian research school in chemistry and is regarded as the father of chemical science in India. The Royal Society of Chemistry honoured his life and work with the first ever Chemical Landmark Plaque outside Europe. He was the founder of Bengal Chemicals & Pharmaceuticals', India's first pharmaceutical company. He is the author of "A History of Hindu Chemistry from the Earliest Times to the Middle of Sixteenths Century (1902)".In this book he showed, from an unbiased scientific standpoint, how much the knowledge of acid, alkali, metals, and alloys proceeded in different epochs of Indian history. He showed that, the science of metallurgy and of medicine had advanced significantly in ancient INDIA. LINKS of the great book (vol-1 . http://bit.ly/2EXzEJG vol-2 . http://bit.ly/2JCEOal)

In 1896, he announced a major discovery of a new compound, Mercurous nitrite.

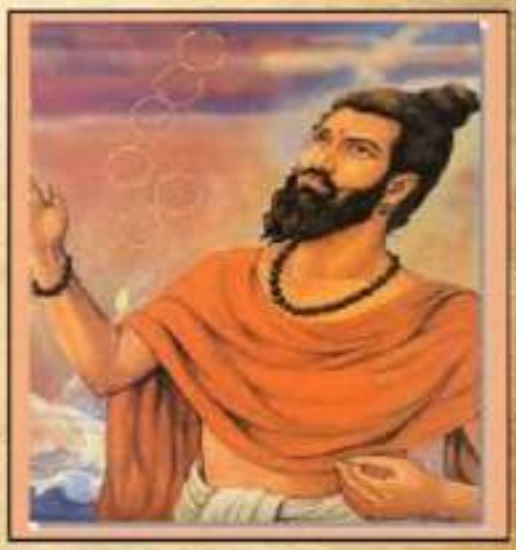
Thesis:- Conjugated Sulphates of the Copper-Magnesium Group: A Study of Isomorphous Mixtures and Molecular Combinations (1887)

Awards :- 1912 Companion of the Order of the Indian Empire (CIE) 1919 Knight Bachelor 1902 Fellow of the Chemical Society (FCS) 1935 Foundation Fellow of the National Institute of Sciences of India (FNI) 1943 Fellow of the Indian Association for the Cultivation of Science (FIAS)



Acharya Kanad - The Father of Atomic Theory

Passion or profession: Scientist
Period: 600 BC



Modern science credits the atomic theory to an English chemist and Physicist named John Dalton(1766-1844) . However, not many people are aware that a theory of atoms was formulated approximately 2500 years before Dalton by an Indian sage and philosopher named Acharya Kanad. Acharya Kanad was born in 600 BC in Prabhas Kshetra(near Dwaraka) in Gujrat, India. His real name was kashyap. He was a Hindu sage and philosopher who founded the philosophical school of Vaisheshika and authored the text Vaisesika Sutra. He also wrote a book on his research "Vaisheshik Darshan" and known as "The Father of Atomic Theory ".

Kanad came up with the idea that any (atom) was an indestructible particle of matter. An interesting story states that this theory occurred to him while he was walking with food in his hand. As he nibbled at the food in his hand, throwing away the small particles, it occurred to him that he could not decide the food into further parts and thus the idea of a matter which cannot be divided further came into existence. He called that indivisible matter anymore, i.e. molecule, which was misinterpreted as atom. He also stated that anu can have two states - absolute rest and a state of motion.

Adherents of the school of philosophy formed by kanad considered the atom to be indestructible, and hence eternal. They believed atoms to be minute objects invisible to the naked eye which come into being and vanish in an instant. Vaiseshikas further held that atoms of same substance combined with each other to produce dvyanuka (diatomic molecules) and tryanuka (triatomic molecules). Kanad also put forward the idea that atoms could be combined in various ways to produce chemical changes in presence of other factors such as heat. He gave blackening of earthern pot and ripening of fruit as examples of this phenomenon.

Satyendra Nath Bose

Satyendra Nath Bose was an eminent physicist after whom 'Bosons', one of the two classes of particles in quantum mechanics, was named. He was a self-taught scholar who rose to prominence during the 1920s for his work on quantum mechanics and went on to work with the renowned German physicist, Albert Einstein.

During the time Quantum theory and related concepts were creating a stir in the scientific community, Bose did some important work in this field, particularly on the Planck's black body radiation law. He sent his work to Albert Einstein who recognized the significance of the Indian scientist's findings and soon collaborated with him to work on certain important ideas that formed the basis for Bose-Einstein statistics.

Satyendra Nath Bose is best known for giving the concepts of 'Boson', which refers to one of the two classes of particles. His work in quantum physics was further developed by Albert Einstein which laid the foundation for Bose-Einstein statistics and the theory of the Bose-Einstein condensate.

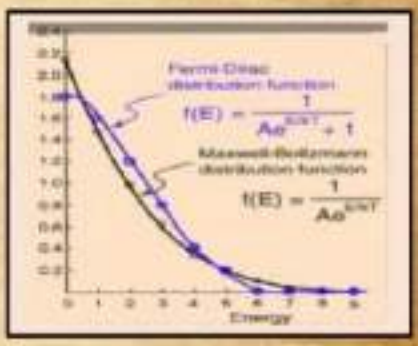
The Government of India bestowed upon this eminent physicist the title of Padma Vibhushan in 1954 for his services towards science and researeh.

NOTABLE EXPERIMENTS

1. Bose Einstein Condensate

A states of matter in which separate atoms or subatomic particles, cooled to near absolute Zero(0K). This State was first proposed by Satyendranath Bose and Albert Einstein.

2. Bose Einstein Statistics

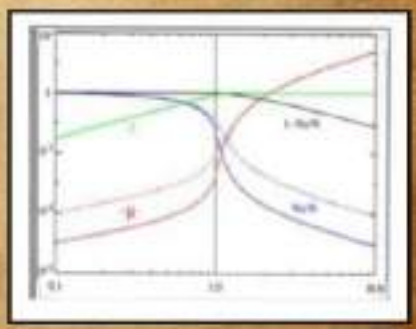


In Quantum Statistics Bose Einstein Statistics describe one of Two possible ways in which a collection of Non-Interacting, Indistinguishable particles may occupy a set of available discrete state of Thermodynamic Equilibrium.

3. Boson

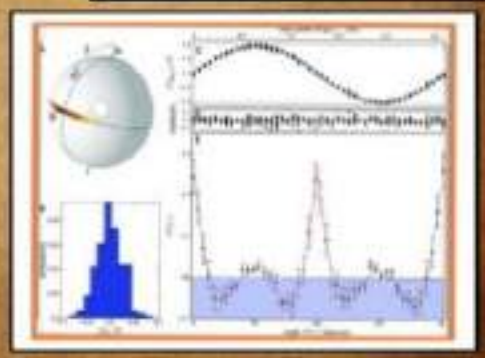
In Quantum Mechanics A Boson is a Particle that follow Bose Einstein Statistics. Boson make up one of Two classes of elementary particle.

4. Bose Gas



An ideal Bose gas is a Quantum Mechanical Phase of matter analogues to a classical ideal gas. It is composed of Boson, which have a integer value of spin and obey Bose Einstein Statistics.

5. Bose Einstein Correlation



In Physics, Bose Einstein Correlation is between Identical Bosons. They have important application in Astronomy Optics and Nuclear Physics

Sir Shanti Swaroop Bhatnagar

21 February 1894 – 1 January 1955

An Indian colloid chemist, academic and scientific administrator. The first director-general of the Council of Scientific and Industrial Research (CSIR), he is revered as the "father of research laboratories" in India. He was also the first Chairman of the University Grants Commission(India) (UGC).In 1940 he is selected as director of "Bord of scientific industrial Research"
Letter the company Krown as "Scientific Industrial research".He was the 1st Seater Secretary general of Atomic energy commission. His field of work is physical chemistry, colloidal chemistry and magnetic chemistry.

From the basis of his theory we a get Anti Rust cloth, some Lubricants, extinguiser some foam and varnish.

He invents alternative of glass and how to extract the Castor oil and he made plastic from garbage.

You have hereby raised the status of the university teachers in the estimation of public, not to speak of the benefit conferred on your Alma Mater. [Meghnad Saha wrote to Shanti Swaroop Bhatnagar in 1934]

NOTABLE EXPERIMENTS

The method of making odorless wax cradit goes to him. He was first who purify Kerosene in such way that why brightness of light increase.He invented Interference Balance.Shanti Swaroop Bhatnagar was awarded a scholarship by the Dayal Singh College Trust to study abroad, and he left for America via England. However, he could not find open berths on English ships, as they were all reserved for American troops, who were then being demobilised due to the First World War. The Trustee permitted him to join the University College London under chemistry professor Frederick G. Donnan. He earned his Doctorate in Science in 1921.

While in London, he was supported by the British Department of Scientific and Industrial Research with a fellowship of £250 a year. In August 1921, he returned to India and immediately joined the newly established Banaras Hindu University (BHU) as a professor of chemistry, where he remained for three years. He wrote the 'Kulgeet', or University song. Justice N.H. Bhagwati, the then Vice-Chancellor of BHU said: "Many of you perhaps do not know that besides being an eminent scientist, Professor Bhatnagar was a Hindi poet of repute and that during his stay in Banaras, he composed the 'Kulgeet' of the University. Professor Bhatnagar is remembered with reverence in this University and will continue to be so until this University exists." He then moved to Lahore as a Professor of Physical Chemistry and Director of University Chemical Laboratories of the University of the Punjab. This portion of his career was the most active period of his life in original scientific work. His research interests included emulsions, colloids, and industrial chemistry, but his fundamental contributions were in the field of magneto-chemistry, the use of magnetism for the study of chemical reactions. In 1928 he and K.N. Mathur jointly developed the Bhatnagar-Mathur Magnetic Interference Balance, which was one of the most sensitive instruments at the time for measuring magnetic properties. It was exhibited at the Royal Society Soiree in 1931 and it was marketed by Messers Adam Hilger and Co., London.

Dr. Venkatraman Ramakrishnan

5th April 1952 at Chidambaram in Tamil Nadu,India

He mainly worked on the structure and function of the ribosome as well as in macromolecular crystallography. Since 1999, he has worked as a group leader at the Medical Research Council (MRC). Laboratory of Molcular Biology (LMB) on the Cambridge Biomedical Campus, UK. In 2009, he was awarded the Nobel Prize in Chemistry for "studies of the structure and function of the ribosome". He also got the "Padma Vibhusan" in 2010. He was elected " President of the Royal Society" for a term of 5 years starting in 2015.

In 1999 Ramakrishnan's laboratory published a 5.5 angstrom resolution structure of the 30S subunit. In 2007, his laboratory determined the atomic structure of the whole ribosome in complex with its mRNA and tRNA ligands. Since 2013, he has primarily used cryo-EM to determine new ribosome structures. Ramakrishnan is also known for his past work ok histone and chromatine structure.

As of 2019 his most cited papers (according to Google Scholar) have been published in Nature, Science, and Cell.

In an interview in July 2018, he said that Britain's decision to leave the European Union (Brexit) was hurting Britain's reputation as a good place to work in science, commenting "It's very hard for the science community to see any advantages in Brexit. They are pretty blunt about that." He saw advantages to both the UK and the EU for Britain to continue to be engaged in Galileo and Euratom, which, unlike the European Medicines Agency, are not EU agencies.

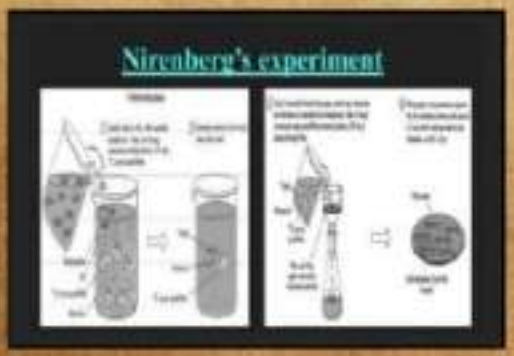
Har Gobind Khorana

9 January 1922 in Raipur, India

Biochemist who received the 1968 Nobel Prize in physiology or medicine for his work in deciphering the genetic code and who was also the first scientist to create an artificial gene.
Khorana performed the research on the genetic code for which he won the Nobel Prize at Wisconsin in the 1960s. It had been established previously that DNA is a long, double-stranded molecule composed of four different building blocks, or nucleotides.
The Nobel Prize in Physiology or Medicine 1968 was awarded jointly to Robert W. Holley, Har Gobind Khorana and Marshall W. Nirenberg "for their interpretation of the genetic code and its function in protein synthesis."

Work on Electron Diffraction

In the 1950s, it was established that genetic information is transferred from DNA to RNA, to protein. One sequence of three nucleotides in DNA corresponds to a certain amino acid within a protein.
Har Gobind Khorana made important contributions to this field by building different RNA chains with the help of enzymes. Using these enzymes, he was able to produce proteins. The amino acid sequences of these proteins then solved the rest of the puzzle.



Two Indian Female Chemists
&
Their contributions Towards Chemistry

Asima Chatterjee
(1917 - 2006)

Notable Works

Research on vinca alkaloids (derived from the periwinkle that is known for its anti-cancer properties)

Development of anti-epileptic & anti-malarial drugs.

Notable Works

Development of specially designed homogenous/ heterogeneous catalysts for chemical reactions with ennovative scientific inputs

Utilization of non-meterials, hydrotalcites & hydroxyapatites as supports and catalysts for asymmetric catalysis and C-C/C-N coupling reactions.

M. Laksmi Kantam
(1955 - ....)

"A Proton and a Neutron are walking down the street. The Proton says, "wait I dropped an electron help me, look for it". The Neutron says, "Are you sure?" The Proton replies, " I'm Positive". (Just for making fun with Chemistry)

What is Chemistry?

Chemistry is the fundamental science of all sciences. Because Chemistry is in Physics, Biology, Geology and Engineering.

The Day We Start With : TOOTHPASTE

The Day We End With : TOOTHPASTE

On the other hand, in such a pandemic like "COVID-19" our main useful materials like Soap, Handwash, Disinfector, Sanitizer all these things are the product given by CHEMISTRY.

Therefore one can see that, Chemistry is on the whole in our everyday life. That's why Chemistry can be good and bad. Chemistry is good when one makes love with it and is bad when one makes crack with it.

CREDITS

CONTENT WRITERS

ADITI ADHIKARI

ARNAB SADHUKHAN

JAYA DAS

NELOY KUMAR GHOSH

NILAY KANTI HORE

PRONAY ROY

RAHUL GHOSH

SAGAR DAS

SANAM ALI

EDITORS

KRISHNAMAY PAL

NELOY KUMAR GHOSH